COMPARATIVE DEMOGRAPHIC STUDY OF BROWN AND COLLARED LEMMINGS ON BYLOT ISLAND, NUNAVUT

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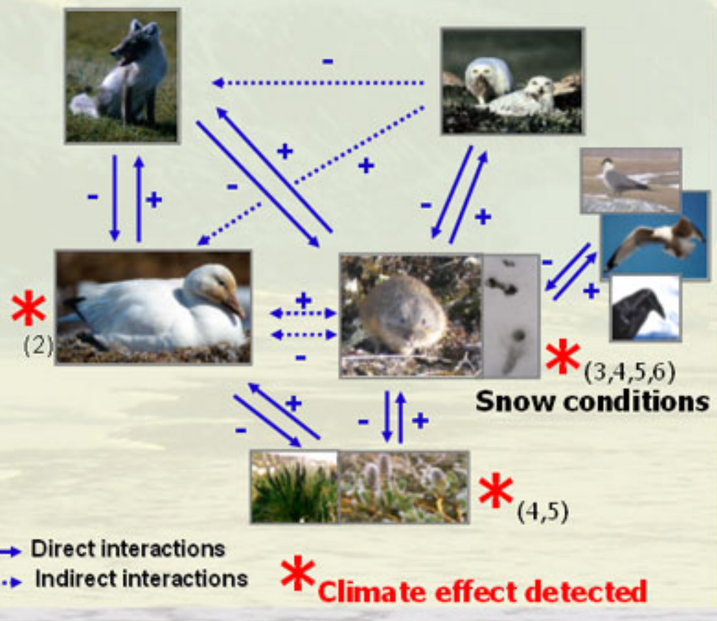
Introduction

- Changes in climate have direct and indirect impacts on the survival and reproduction of arctic animals.
- Within ecosystems, trophic interactions link together the demography of species. For example, a change in lemming abundance affects breeding success of Arctic Foxes and Snowy Owls.

Trophic interactions on Bylot Island (1)



- OBJECTIVE: To provide the basis for a long-term study linking lemming demography to climate variability.

Live Trapping Methods

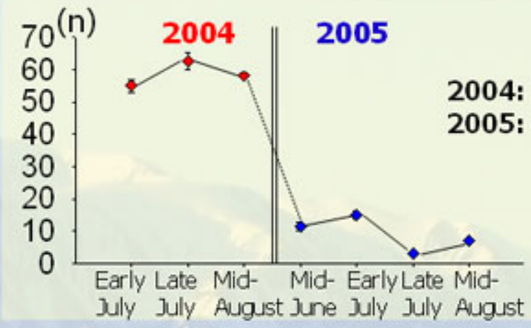
- During the summer, we used 2 grids (300 X 300 m) of 100 Longworth© traps: one in a wet meadow and one in a dryer habitat.
- We trapped during 15 days in 2004 and 2005.
- Trapped animals were identified, sexed, weighed and marked with electronic PIT tags.
- We estimated demographic parameters with the Closed Capture Model and the Design Robust Model.

Results

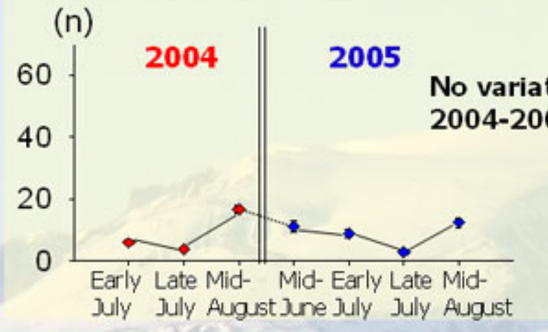
Brown Lemming

Collared Lemming

ABUNDANCE

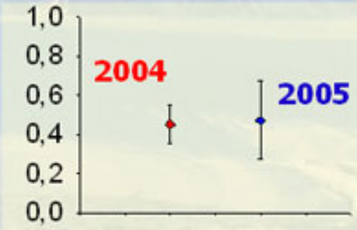


2004: peak phase
2005: decline phase

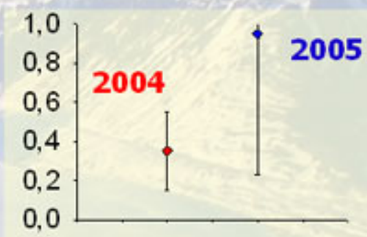


No variation between 2004-2005

SURVIVAL RATE

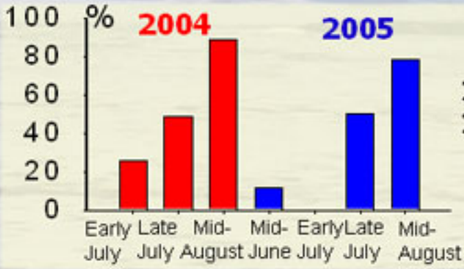


Constant between peak and decline phase

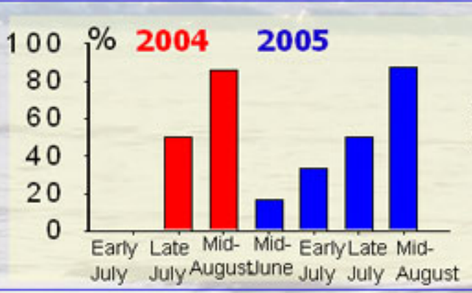


No difference between 2004-2005

REPRODUCTION

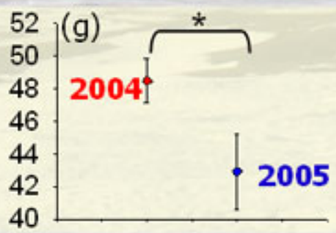


2004: $\bar{X}$ =55.8%
2005: $\bar{X}$ =28.9%



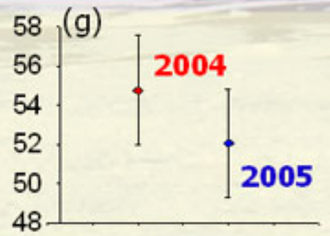
2004: $\bar{X}$=45.2%
2005: $\bar{X}$=56.9%

BODY WEIGHT



2004: N=62
2005: N=20

* p< 0.05



2004: N=11
2005: N=11

Conclusions

- We characterized parameters of the population dynamics of Brown and Collared Lemmings and showed that the two species differed in their dynamics.
- In the Canadian Arctic, abundance and cycle amplitude of rodent populations could be disrupted by shorter and warmer winters, as was suggested recently in Scandinavia(3). This will be our working hypothesis for the years to come.
- Our study sets a methodological and conceptual framework for future incorporation of climatic variables in the determinants of lemming population dynamics in the high Canadian Arctic.

References

(1) Gauthier G. et al. 2004 Trophic Interactions in High Arctic snow goose colony. Integr. Comp. Biol. 44: 119-129.

(2) Dickey M.H. 2006 MSc thesis. Unpublished.

(3) Hörnfeldt B. 2004 Long-Term decline in numbers of cyclic voles in boreal Sweden: analysis and presentation of hypotheses. OiKos 107: 376-392.

(4) Aars J. and Ims R.A. 2002 Intrinsic and climatic determinants of population demography: The winter dynamics of tundra voles. Ecology 83: 3449-3456.

(5) Callaghan T.V. et al. 2004 Effects on the structure of arctic ecosystems in the short and Long-term perspective. Ambio 33: 436-447.

(6) Stenseth N.C. et al. 1993 The biology of lemmings, Academic Press, London.

Acknowledgements

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